Proposed Site-Specific Upper Chattahoochee River Trout Temperature Standard

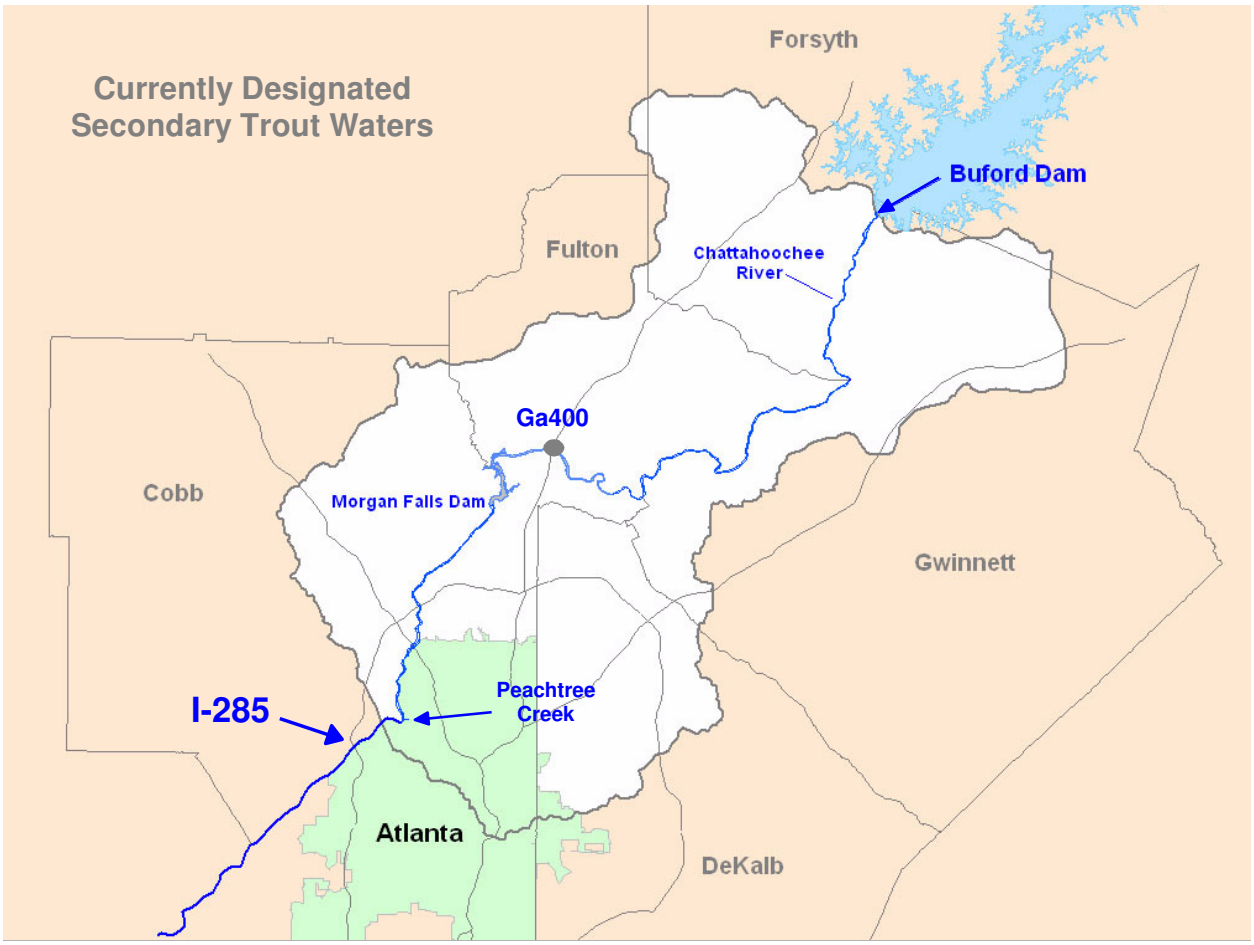
Current Trout Temperature Standard

Secondary Trout Waters:

"In streams designated as secondary trout waters, there shall be no elevation exceeding 2°F of natural stream temperatures".

Primary Trout Waters:

"*In streams designated as primary trout waters by the Wildlife Resources Division, there shall be no elevation of natural stream temperatures".*


Currently Designated
Secondary Trout Waters
Forsyth
Buford Dam
Fulton
Chattahoochee
River
Ga400
Cobb
Morgan Falls Dam
Gwinnett
I-285
Peachtree
Creek
Atlanta
DeKalb

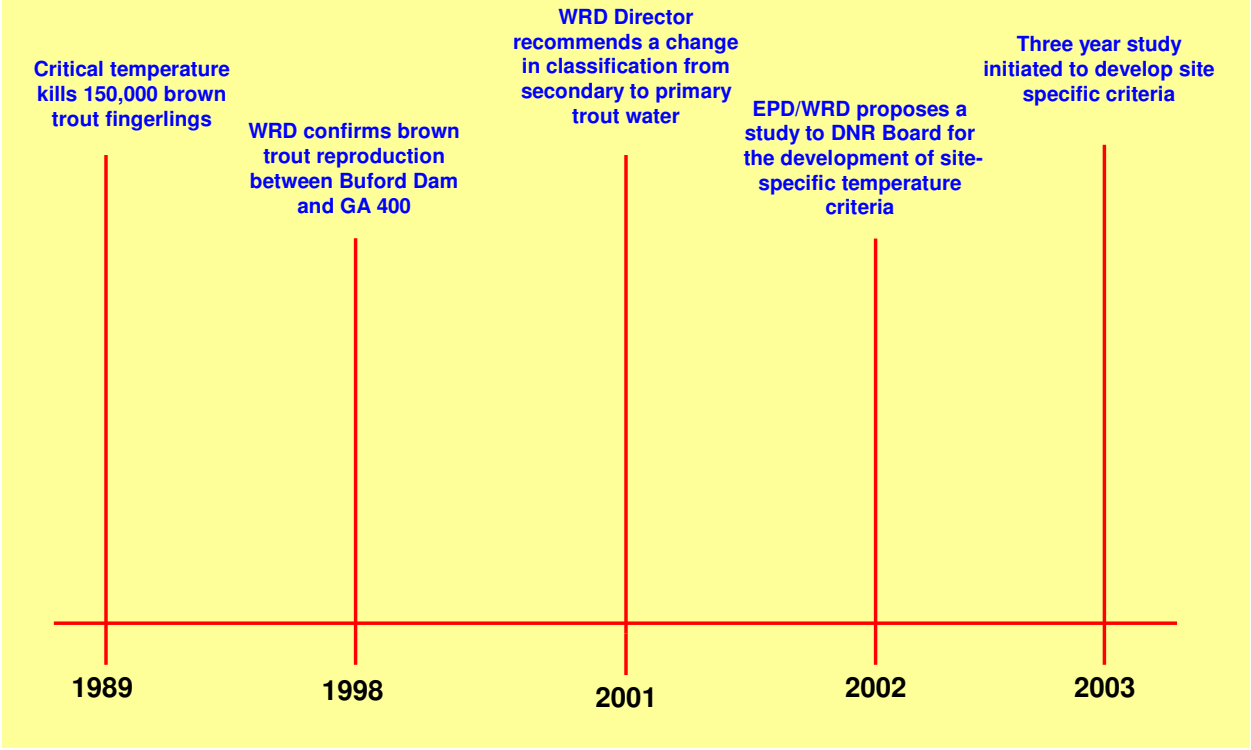
Limitations of the Current Standard

- **Difficult to implement. Need to know both the 'natural' and observed temperature.**

- **Insufficient attention to physiological needs of fishery for both acute and chronic conditions.**

- **May give false indications. Could easily signal violations when a threats do not exist; or, miss a threat when it does exist.**

Time Line


Critical temperature kills 150,000 brown trout fingerlings
WRD confirms brown trout reproduction between Buford Dam and GA 400
WRD Director recommends a change in classification from secondary to primary trout water
EPD/WRD proposes a study to DNR Board for the development of site-specific temperature criteria
Three year study initiated to develop site specific criteria
1989
1998
2001
2002
2003

More than a decade ago…

Trout Reproduction in Chattahoochee River Confirmed!!

Makes Headline News
Sparks Review of Current Standard

May 2002
DNR Board Recommends Study

"Develop new site specific criteria based on scientific information that reflects actual conditions in the River."

"Site Specific" Criteria
Recognize Existing Local Conditions

- River located in large southern metropolitan area.
- Complex river system with intense competition for scarce water resources.
- Highly dynamic river resulting from power generation, storm runoff and treated wastewater.
- Limited amount of coldwater available especially during periods of non-generation.
- Recent climate characterized by severe droughts.

WRD Study Component

- Below Buford Dam:
  - Monitor trout fry and recruitment
- Below Morgan Falls Dam:
  - Monitor seasonal trout abundance
  - Estimate angler effort and success
- Propose temperature criteria

EPD Study Component

- Establish Monitoring Network:
  - Hourly temperature and streamflow
  - Mainstem and tributary stations
- Build Project Database
- Assess Proposed Criteria

Rainbow Trout Stocking

Electrofishing

Survey Anglers

- Trout survival and dispersal were calculated and related to temperature and discharge

- Current survival rates at specific temperatures were used to estimate historical survival rates under pre-urbanized conditions

WRD Recommends
Trout Temperature Criteria

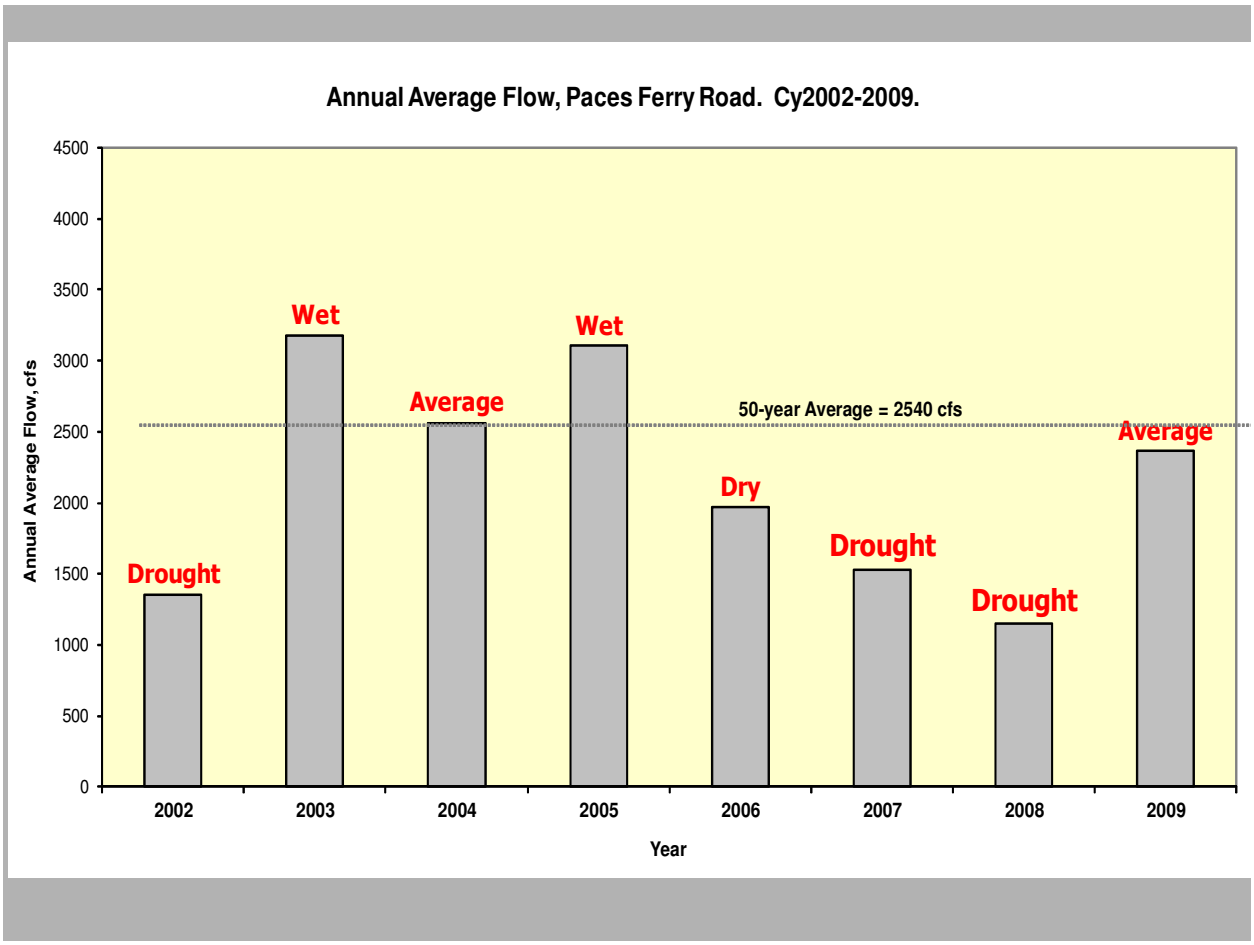
- 22 degC (71.6 degF) Maximum

- 20 degC (68 degF) Maximum
(as 5-day average)

EPD Database for Criteria Assessment

Hourly Streamflow, Temperature
5 Mainstem Stations
7 Tributary Stations

Spans Eight Years 2002-2009
Includes Actual Operations
At Buford Dam


Annual Average Flow, Paces Ferry Road. Cy2002-2009.
Annual Average Flow, cfs
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Drought
Wet
Average
Wet
Dry
Drought
Drought
Average
50-year Average = 2540 cfs
2002
2003
2004
2005
2006
2007
2008
2009
Year

Available Cold Water

- **The existing trout fishery depends on the cold water released from Buford Dam for its existence.**

- **If a large amount of cold water is released from Buford Dam these temperature criteria can be supported for a greater distance downstream on warmer days.**

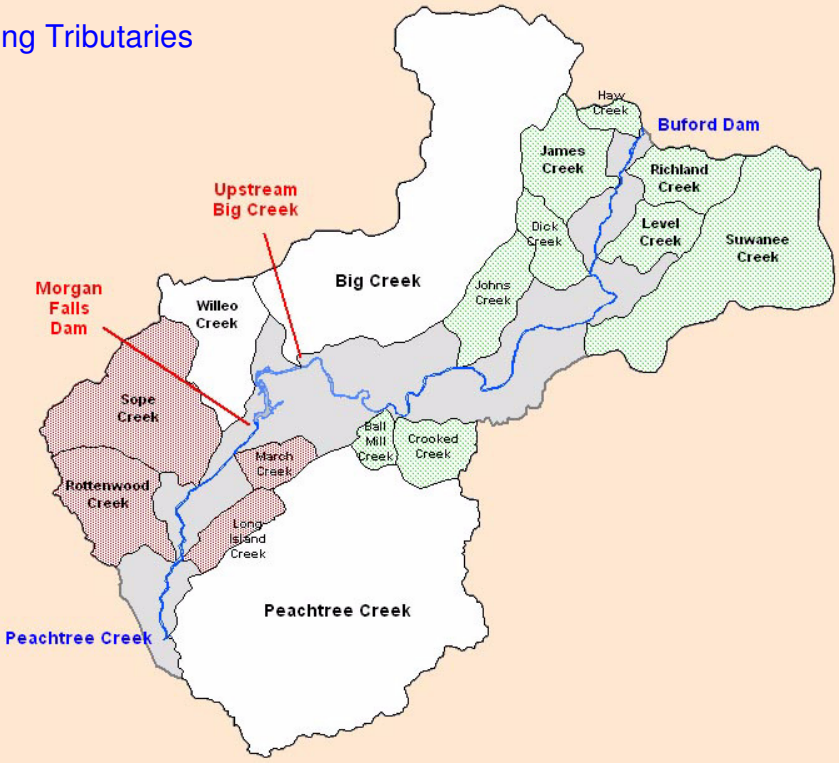
- **If a small amount of cold water is released from Buford Dam these temperature criteria can be supported for a shorter distance downstream on warmer days.**

- **Since the amount of cold water released is highly variable the distance downstream for criteria support is also variable.**

Two Distinct Criteria Zones
Upstream and Downstream

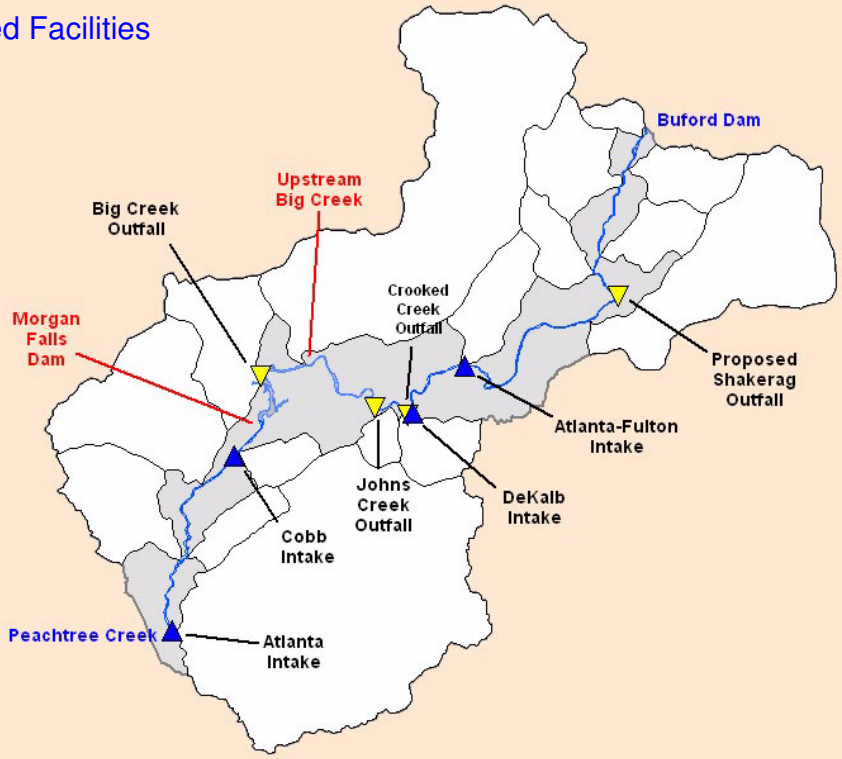
- Free-flowing river interrupted by Lake and Dam
- Uneven availability of cold water
- Temperature regimes are different
- Streamflow regimes are different
- Two Zones are consistent with 2001 WRD request

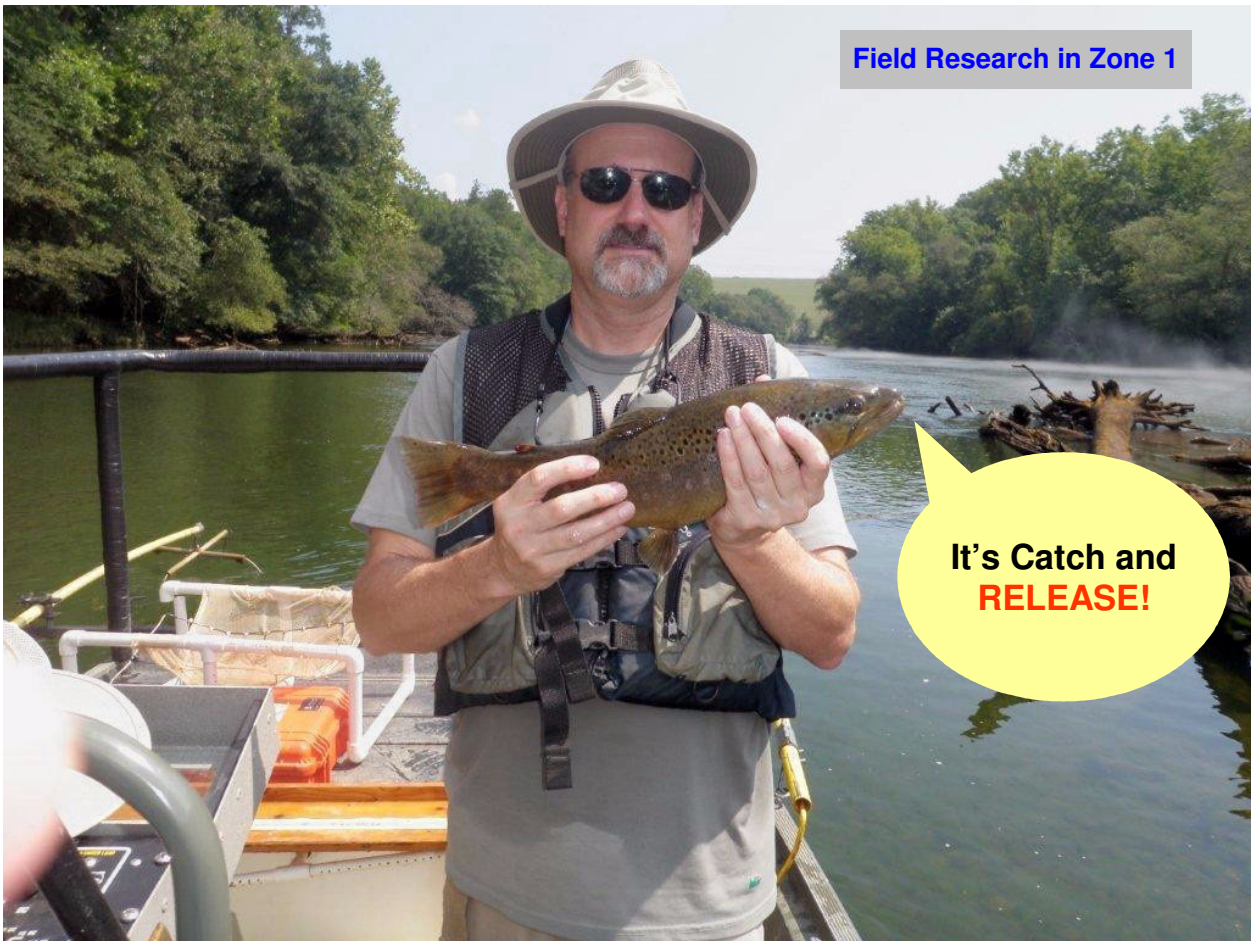
Contributing Tributaries



Incorporated Cities

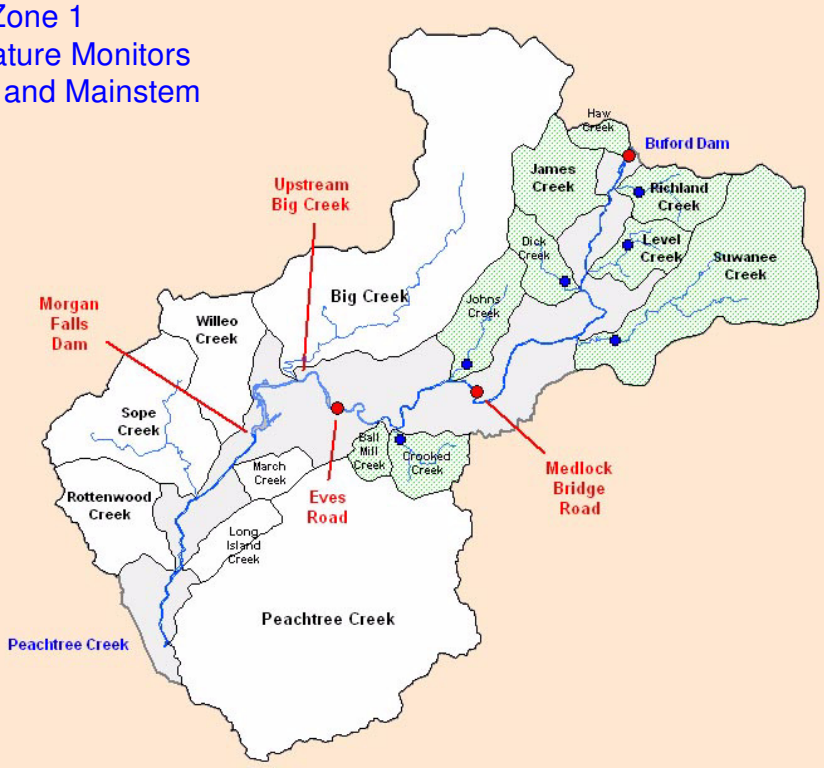
Permitted Facilities

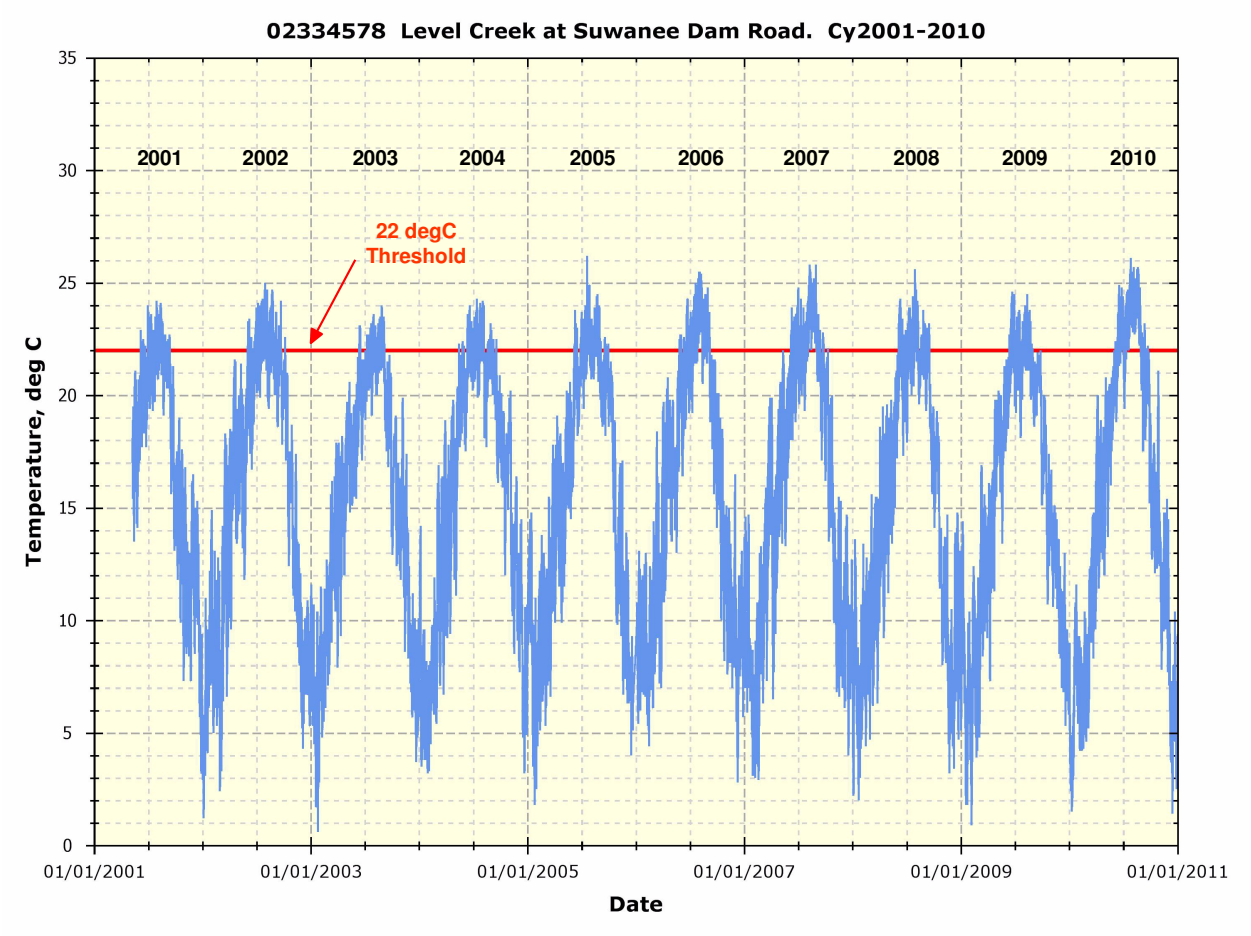


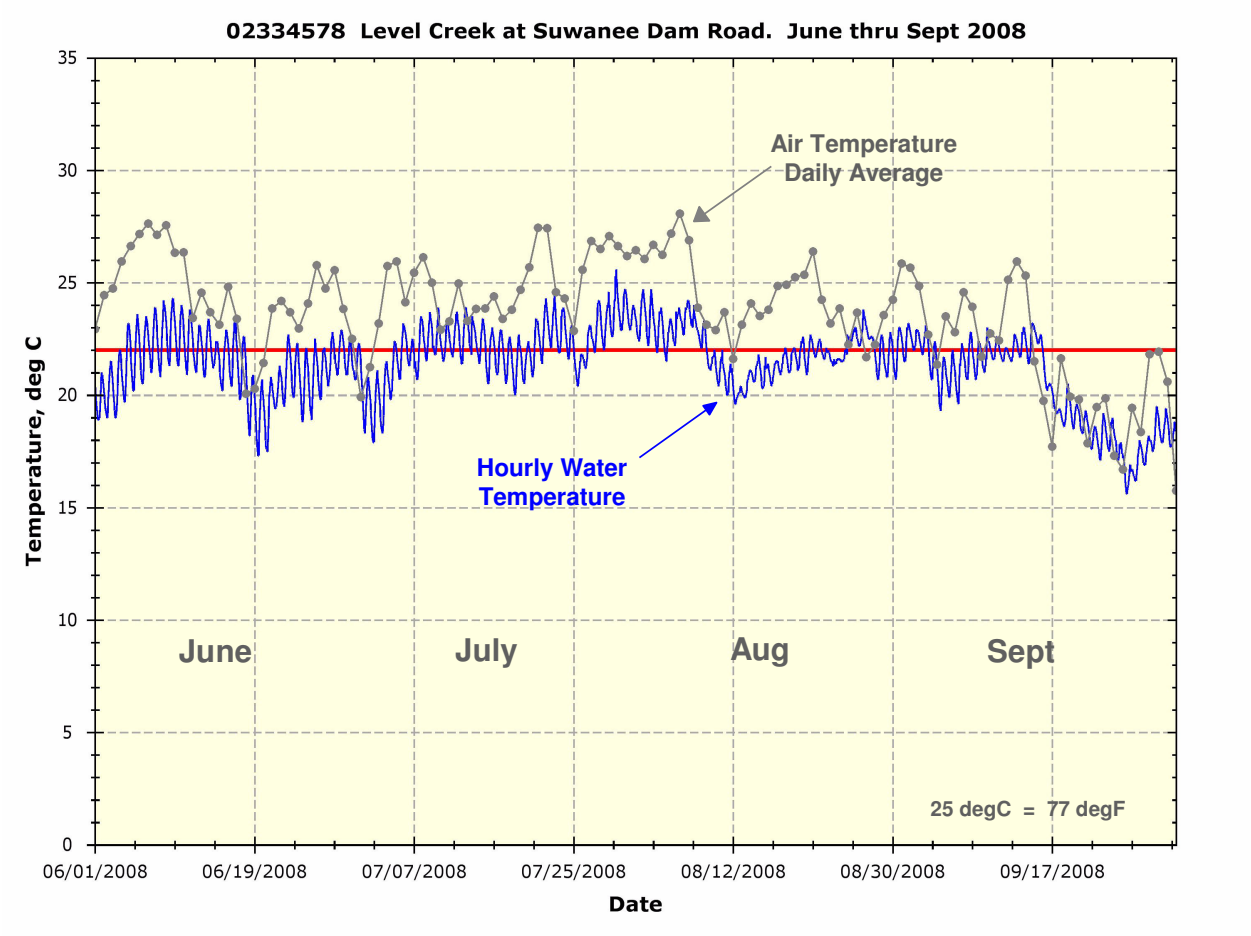

Field Research in Zone 1
It's Catch and
RELEASE!

Zone 1
Criteria Assessment

Zone 1
Temperature Monitors
Tributary and Mainstem




02334578 Level Creek at Suwanee Dam Road. Cy2001-2010
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
22 degC
Threshold
Temperature, deg C
0
5
10
15
20
25
30
35
01/01/2001
01/01/2003
01/01/2005
01/01/2007
01/01/2009
01/01/2011
Date

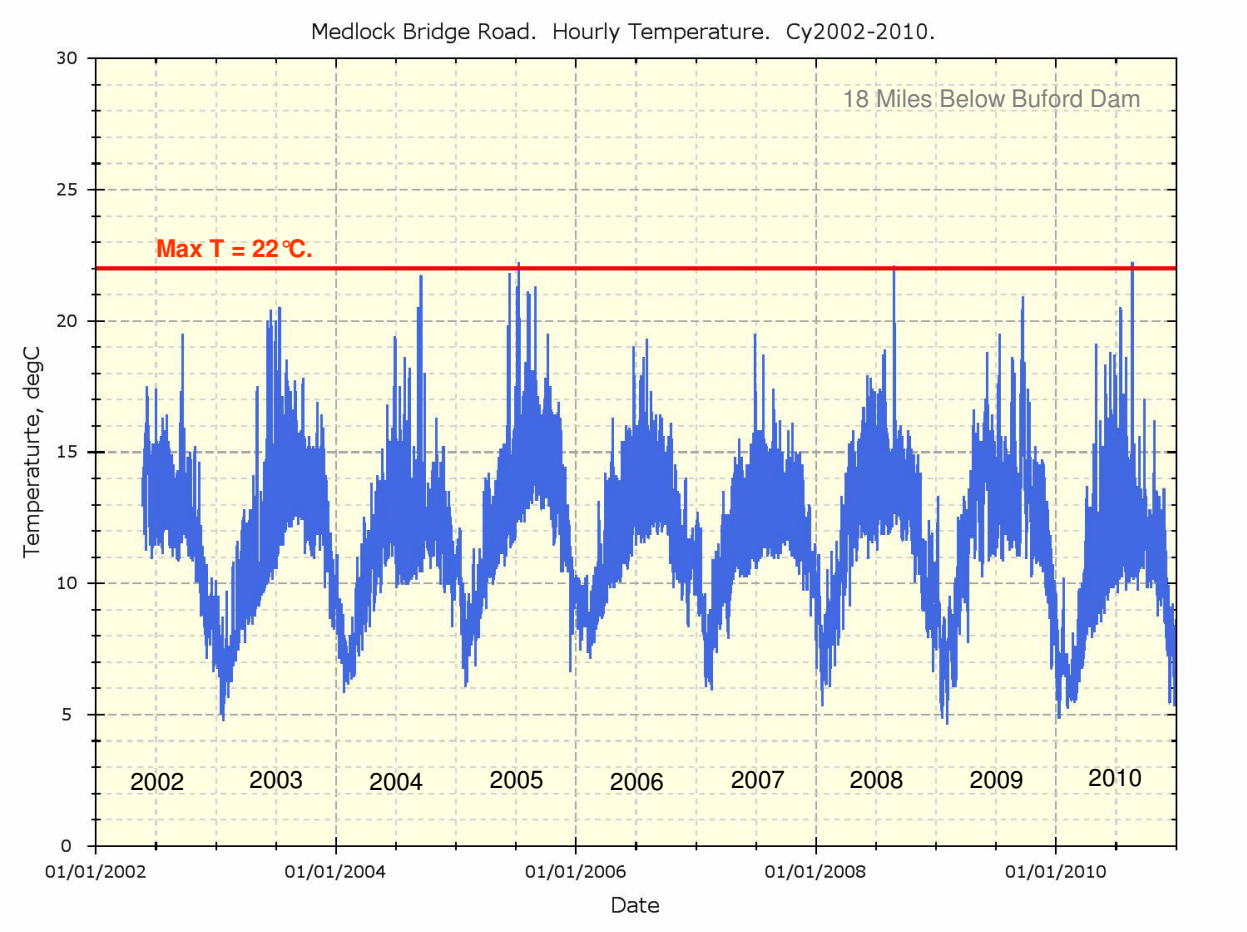

02334578 Level Creek at Suwanee Dam Road. June thru Sept 2008
Air Temperature
Daily Average
Hourly Water
Temperature
June
July
Aug
Sept
25 degC = 77 degF
Temperature, deg C
Date
35
30
25
20
15
10
5
0
06/01/2008
06/19/2008
07/07/2008
07/25/2008
08/12/2008
08/30/2008
09/17/2008

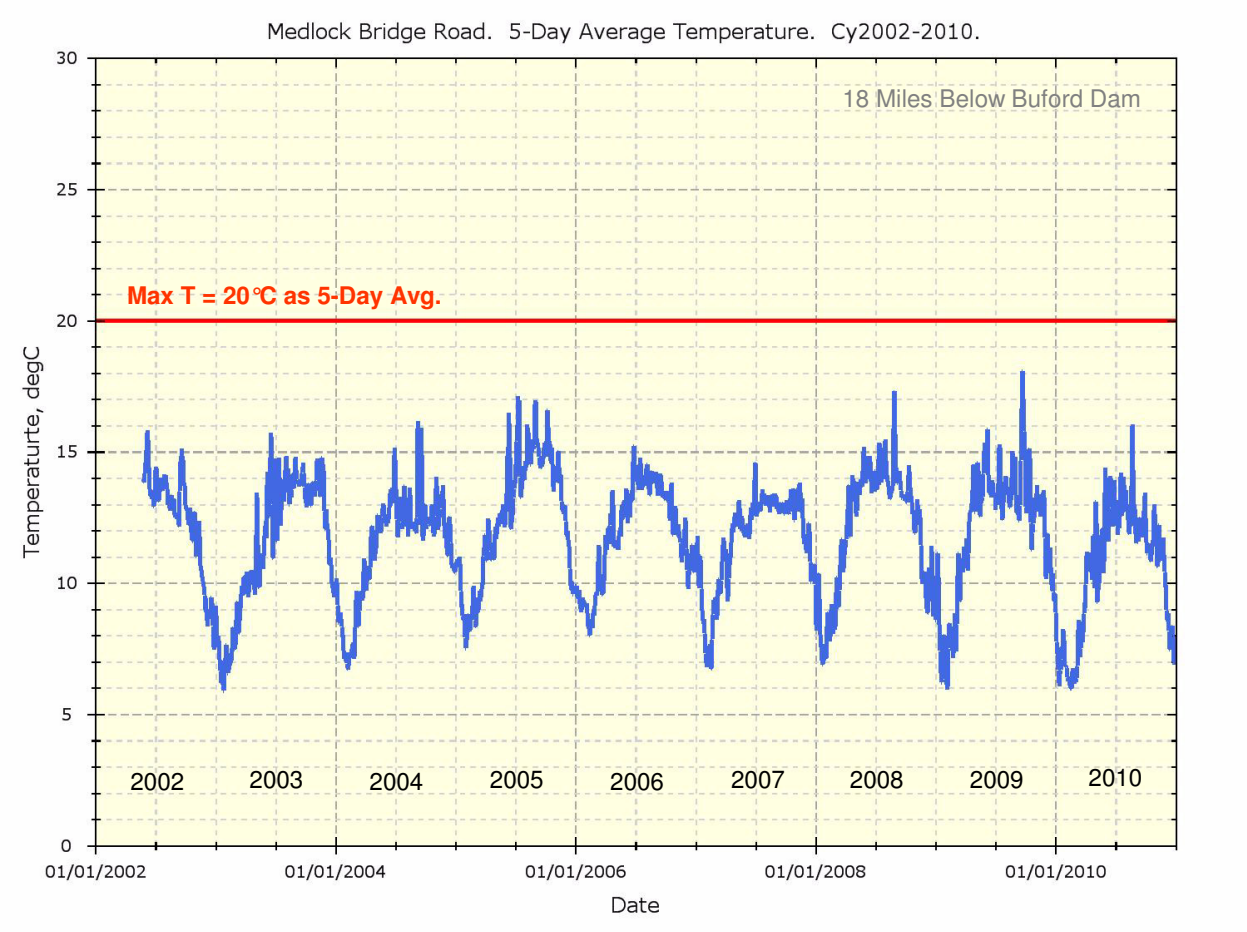
Zone 1
Compare Temperatures
At Medlock Bridge
to

- 22 degC (71.6 degF) Max

and

- 20 degC (68 degF) 5-day Avg


Medlock Bridge Road. Hourly Temperature. Cy2002-2010.
18 Miles Below Buford Dam
Max T = 22℃.
Temperaturte, degC
30
25
20
15
10
5
0
2002
2003
2004
2005
2006
2007
2008
2009
2010
01/01/2002
01/01/2004
01/01/2006
01/01/2008
01/01/2010
Date


Medlock Bridge Road. 5-Day Average Temperature. Cy2002-2010.
18 Miles Below Buford Dam
Max T = 20°C as 5-Day Avg.
Temperaturte, degC
30
25
20
15
10
5
0
2002
2003
2004
2005
2006
2007
2008
2009
2010
01/01/2002
01/01/2004
01/01/2006
01/01/2008
01/01/2010
Date

Zone 1: Designation and Criteria
Upper Chattahoochee Tailwater

"Water temperature shall not exceed 22°C (71.6°F) maximum or 20°C (68°F) as a 5-day average more than once in 30 days in each case".

- **Temperature criteria will be monitored for compliance at USGS gage 02335450 Eves Road.**

- **Intended to protect the reproducing trout population where coldwater releases from Buford Dam exert their greatest influence**

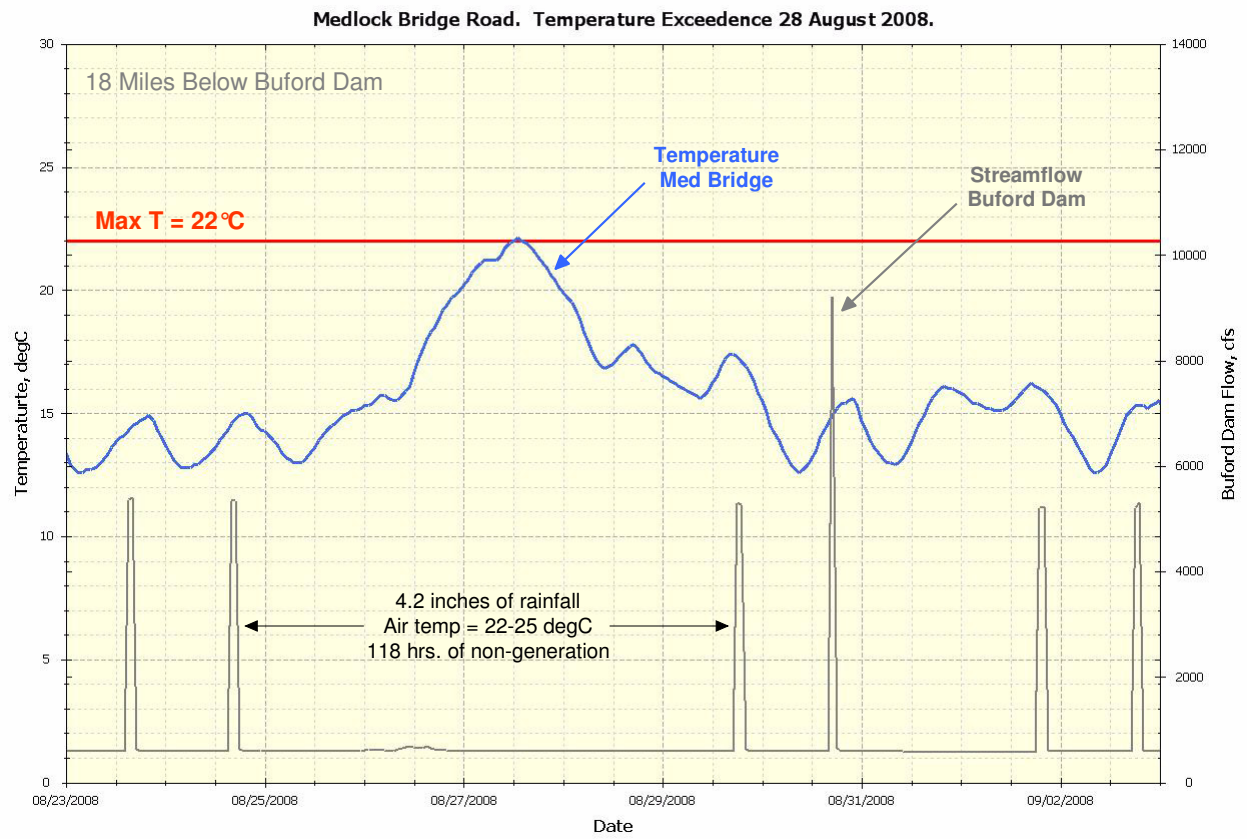
Zone 1: Critical Conditions
Upper Chattahoochee Tailwater

When these conditions occur together

- ✂ **Elevated air temperature**
- ✂ **Extended period of non-generation at Buford Dam**
- ✂ **Storm occurrence during non-generation**

Anatomy
Of a Critical Storm Event

Wednesday 28 August 2008


Medlock Bridge Road. Temperature Exceedence 28 August 2008.
18 Miles Below Buford Dam
Temperature
Med Bridge
Streamflow
Buford Dam
Max T = 22°C
4.2 inches of rainfall
Air temp = 22-25 degC
118 hrs. of non-generation
Temperaturte, degC
Buford Dam Flow, cfs
Date
08/23/2008
08/25/2008
08/27/2008
08/29/2008
08/31/2008
09/02/2008

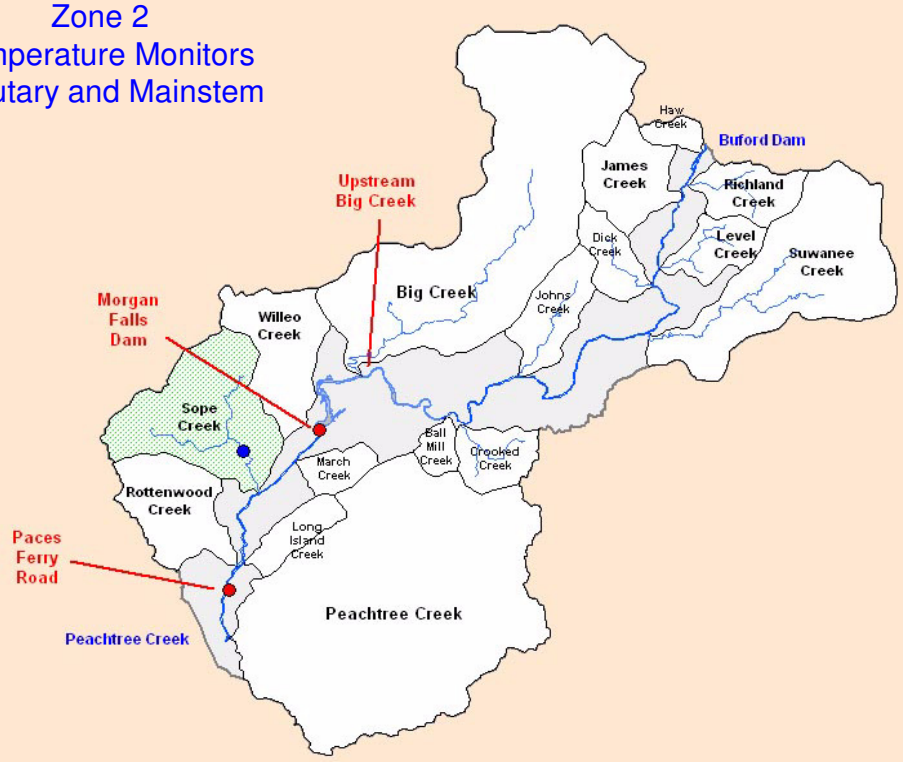
Zone 1: Rainfall Exception
Upper Chattahoochee Tailwater

"During the period from 16 April thru 15 October, criteria exceedences will not be considered violations and will not be used to develop the State's 303(d) listing of impaired waters if they occur under the following conditions:

For Upper Chattahoochee Tailwater Trout waters: rainfall greater than 1 inch occurring during 36 or more hours of non-generation at Buford Dam."

Zone 2
Criteria Assessment

Zone 2
Temperature Monitors
Tributary and Mainstem

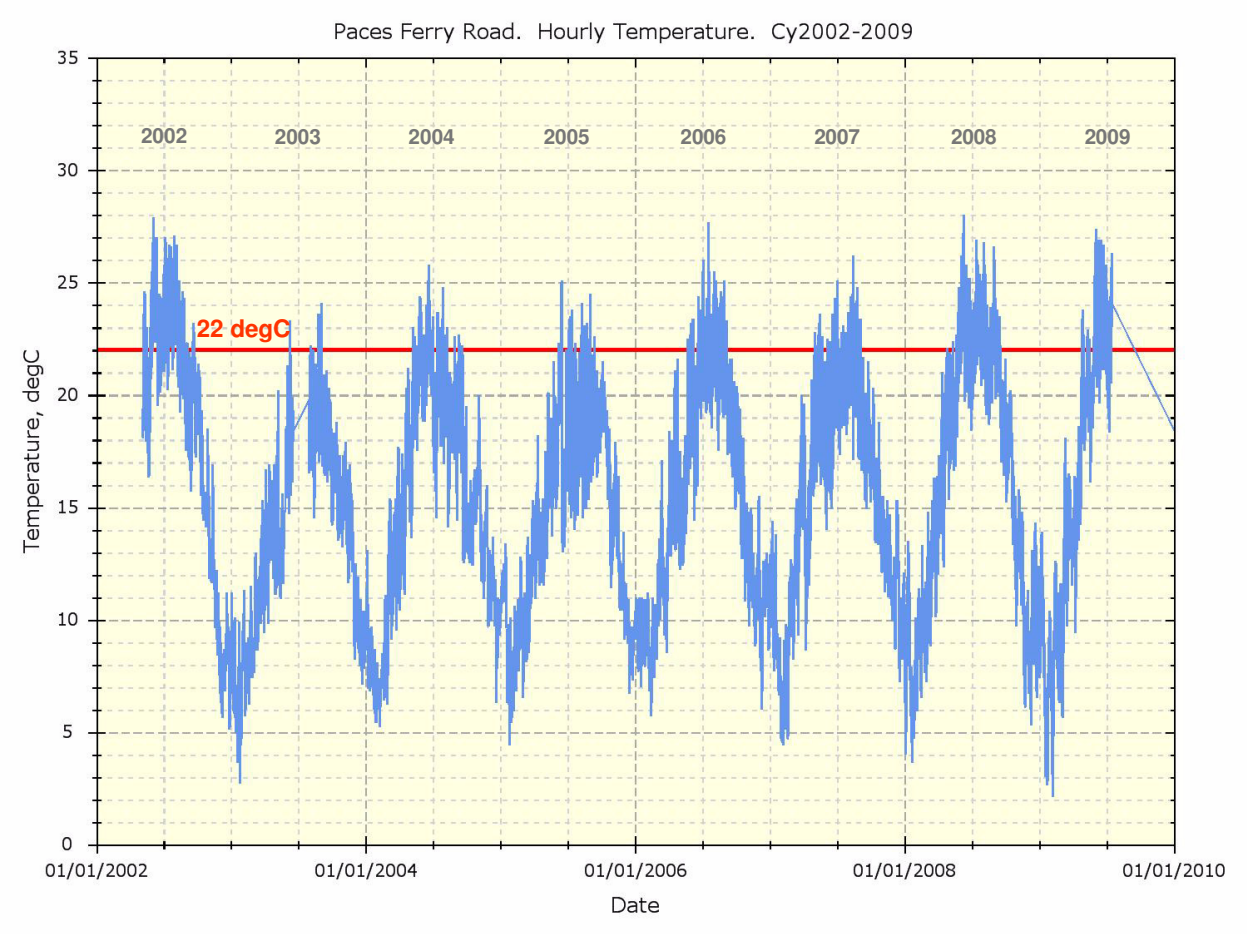


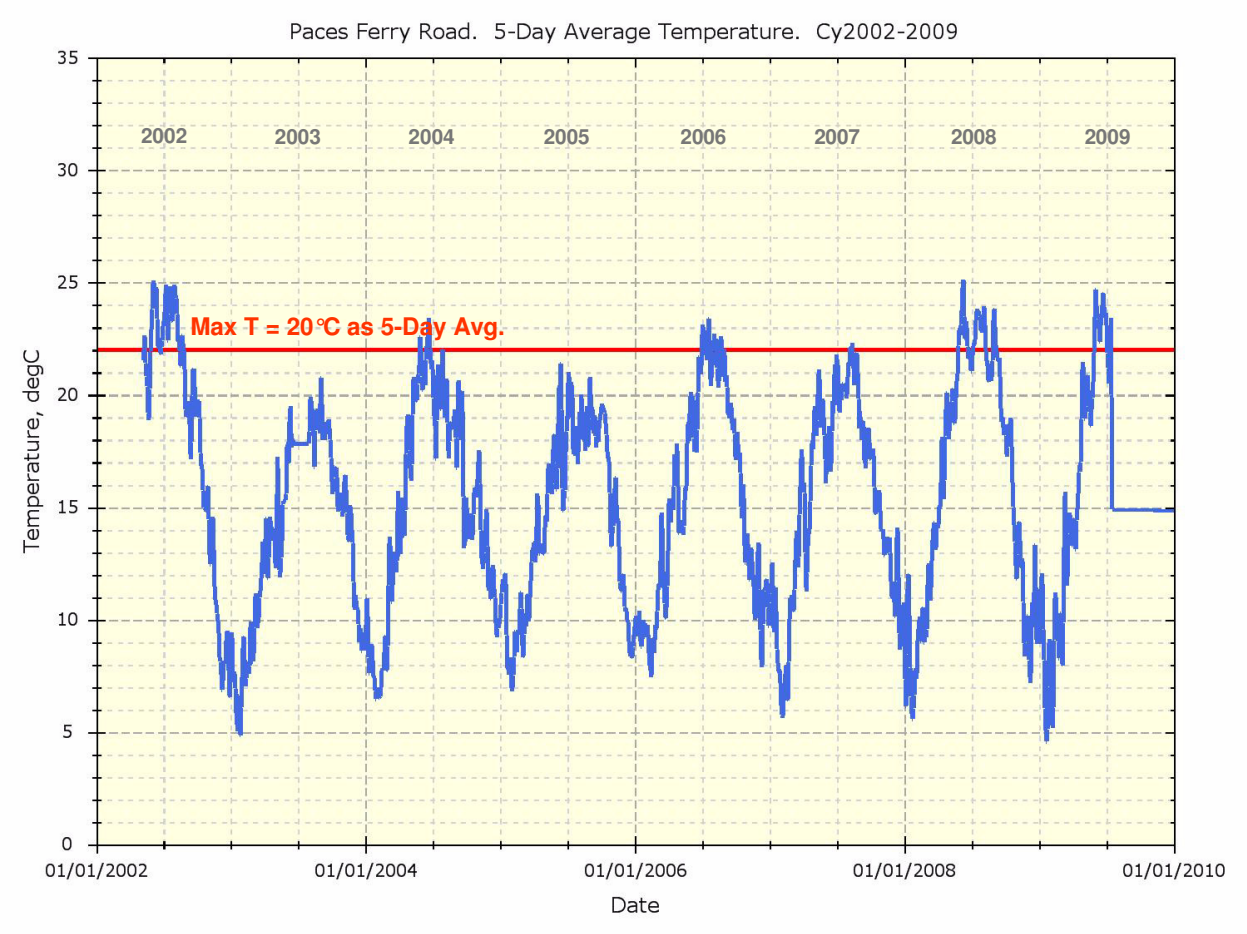
Zone 2
Compare Temperatures
At Paces Ferry Road
to

- **22 degC (71.6 degF) Max**

and

- **20 degC (68 degF) 5-day Avg**


Paces Ferry Road. Hourly Temperature. Cy2002-2009
2002
2003
2004
2005
2006
2007
2008
2009
22 degC
Temperature, degC
35
30
25
20
15
10
5
0
01/01/2002
01/01/2004
01/01/2006
01/01/2008
01/01/2010
Date


Paces Ferry Road. 5-Day Average Temperature. Cy2002-2009
2002
2003
2004
2005
2006
2007
2008
2009
Max T = 20℃ as 5-Day Avg.
Temperature, degC
35
30
25
20
15
10
5
0
01/01/2002
01/01/2004
01/01/2006
01/01/2008
01/01/2010
Date

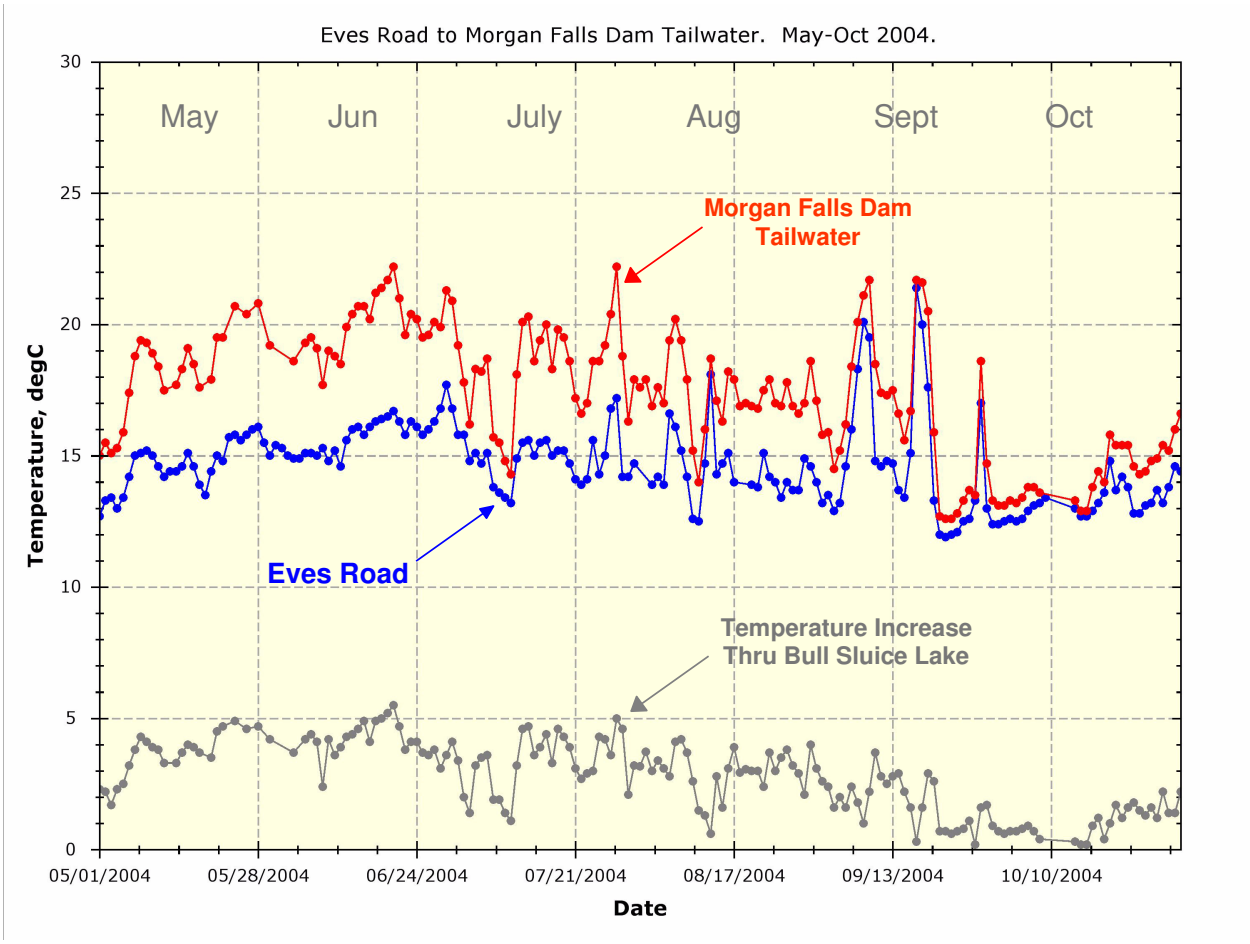
Examine Temperature Increases
Buford Dam to Peachtree Creek

- 50 river miles free-flowing and impounded
- 2.5 to 3 days total travel time at low flow
- First 32 miles, temperature increase in Zone 1
- Then passage thru Bull Sluice Lake
- Accumulating tributary contributions
- Buford coldwater has diminishing influence

Natural Temperature Increase

Passage thru Bull Sluice Lake
8 River Miles

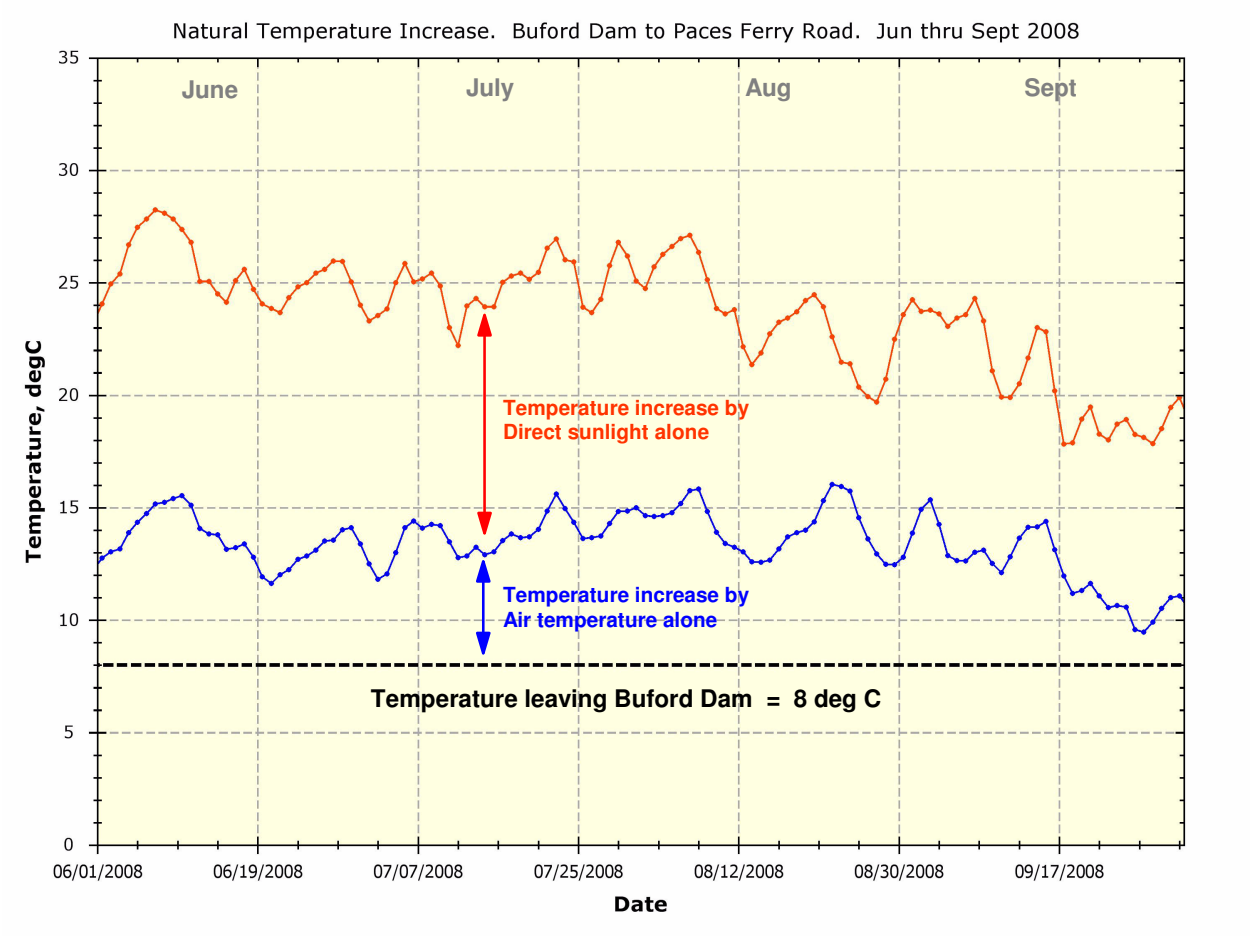
Eves Road to Morgan Falls Dam


Eves Road to Morgan Falls Dam Tailwater. May-Oct 2004.
May
Jun
July
Aug
Sept
Oct
Morgan Falls Dam Tailwater
Eves Road
Temperature Increase Thru Bull Sluice Lake
Temperature, degC
30
25
20
15
10
5
0
05/01/2004
05/28/2004
06/24/2004
07/21/2004
08/17/2004
09/13/2004
10/10/2004
Date

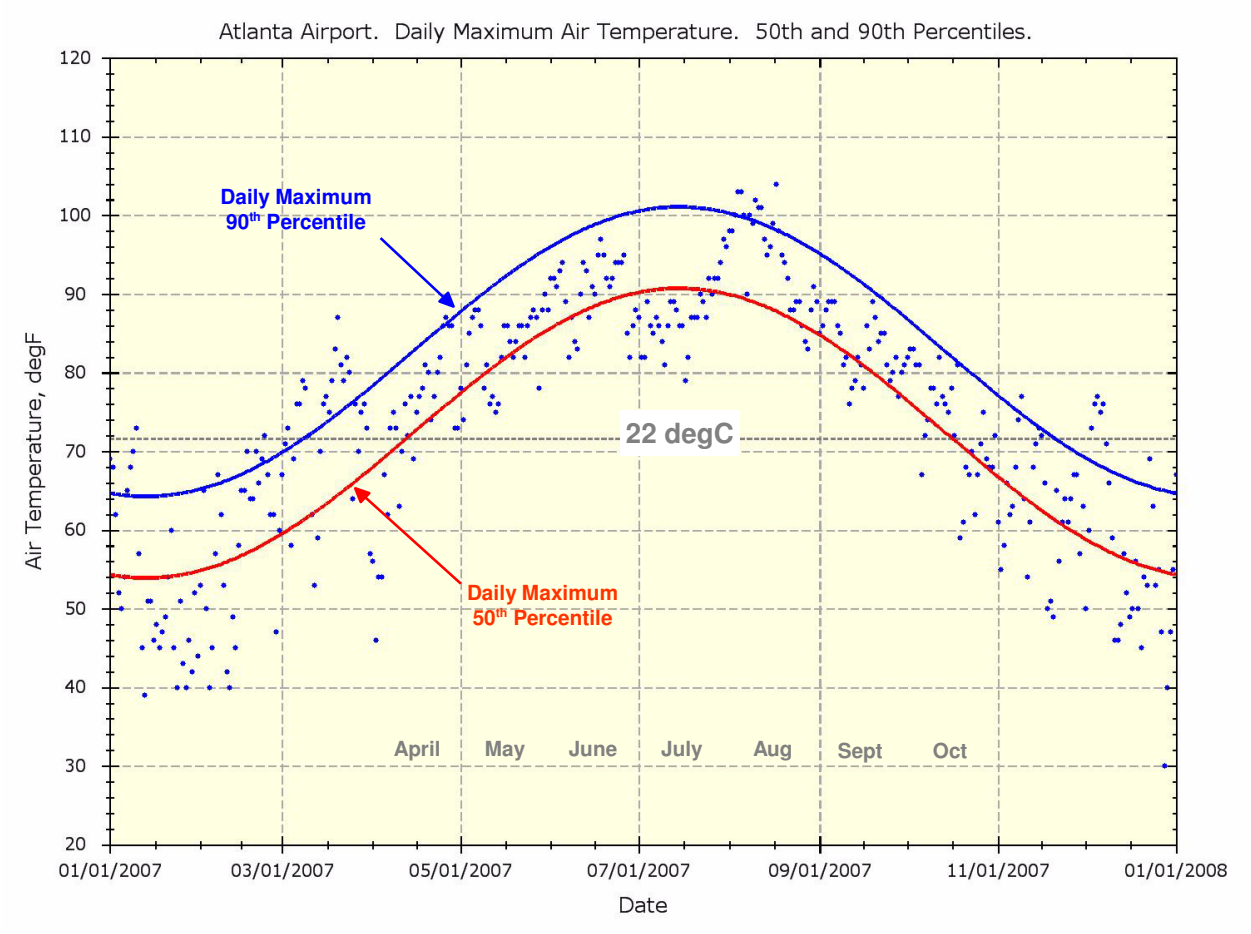
Natural Temperature Increase

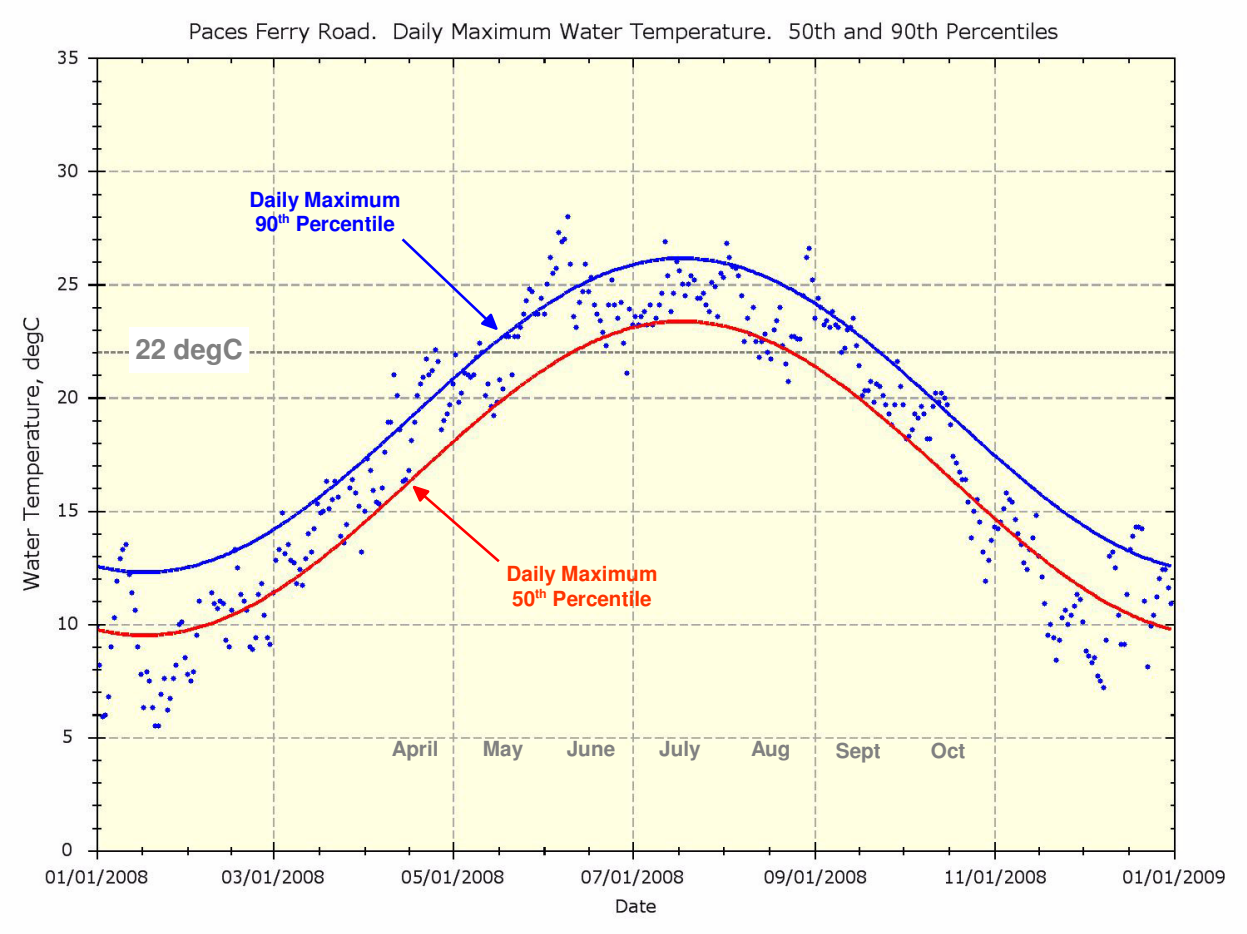
Sunlight and Air Temperature Only

Model Runs
Buford at Non-generation Flow
No Tributary Runoff
No Waste Discharges
No Water Intakes


Natural Temperature Increase. Buford Dam to Paces Ferry Road. Jun thru Sept 2008
June
July
Aug
Sept
Temperature, degC
35
30
25
20
15
10
5
0
Temperature increase by
Direct sunlight alone
Temperature increase by
Air temperature alone
Temperature leaving Buford Dam = 8 deg C
06/01/2008
06/19/2008
07/07/2008
07/25/2008
08/12/2008
08/30/2008
09/17/2008
Date

Zone 2
Seasonal Climate Effects


Atlanta Airport. Daily Maximum Air Temperature. 50th and 90th Percentiles.
Daily Maximum 90th Percentile
Daily Maximum 50th Percentile
22 degC
April
May
June
July
Aug
Sept
Oct
Air Temperature, degF
Date
120
110
100
90
80
70
60
50
40
30
20
01/01/2007
03/01/2007
05/01/2007
07/01/2007
09/01/2007
11/01/2007
01/01/2008

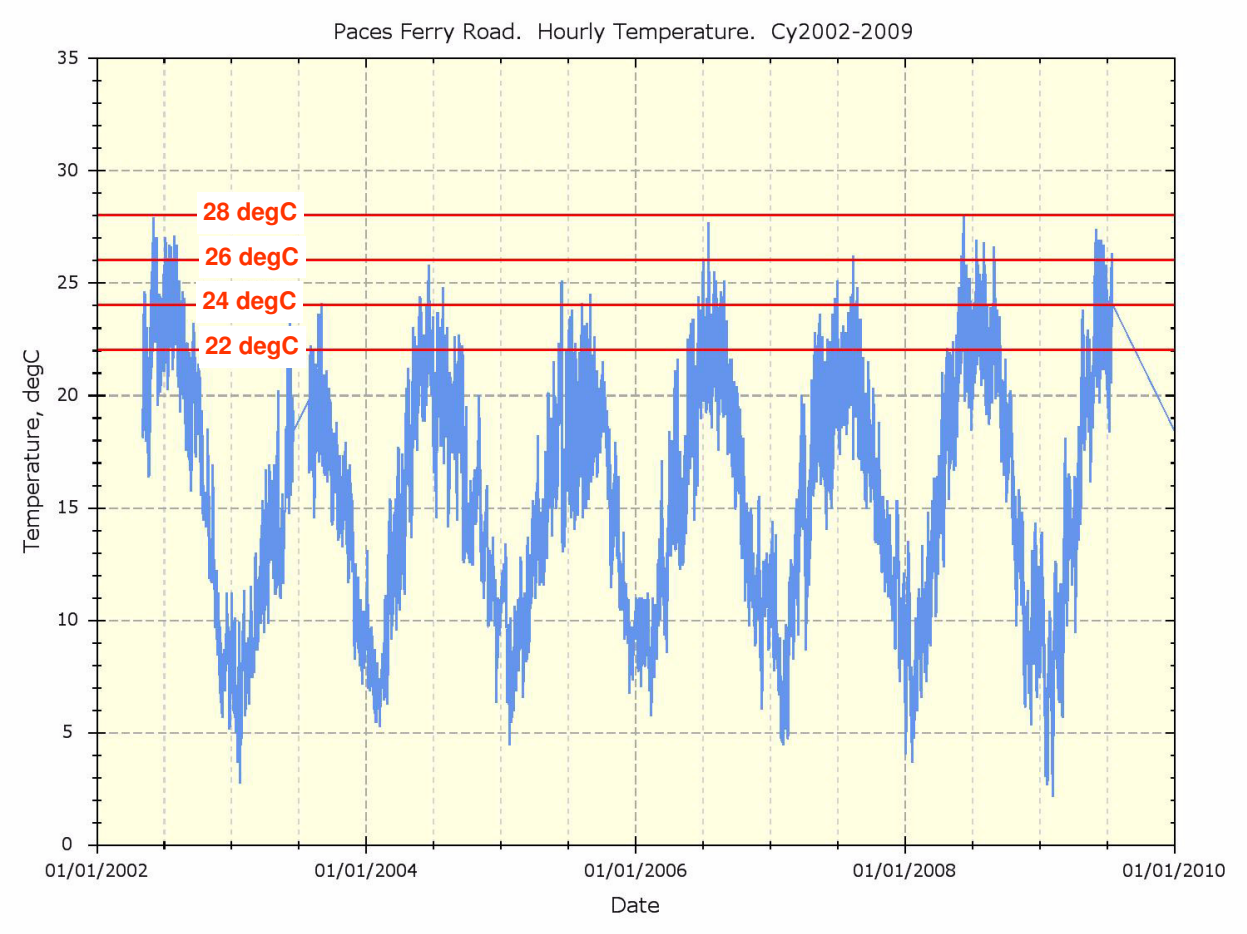

Paces Ferry Road. Daily Maximum Water Temperature. 50th and 90th Percentiles
Water Temperature, degC
Date
Daily Maximum 90th Percentile
Daily Maximum 50th Percentile
22 degC
April
May
June
July
Aug
Sept
Oct
0
5
10
15
20
25
30
35
01/01/2008
03/01/2008
05/01/2008
07/01/2008
09/01/2008
11/01/2008
01/01/2009

Zone 2
Seasonal Criteria

Set Seasonal Maximums
And Date Limits

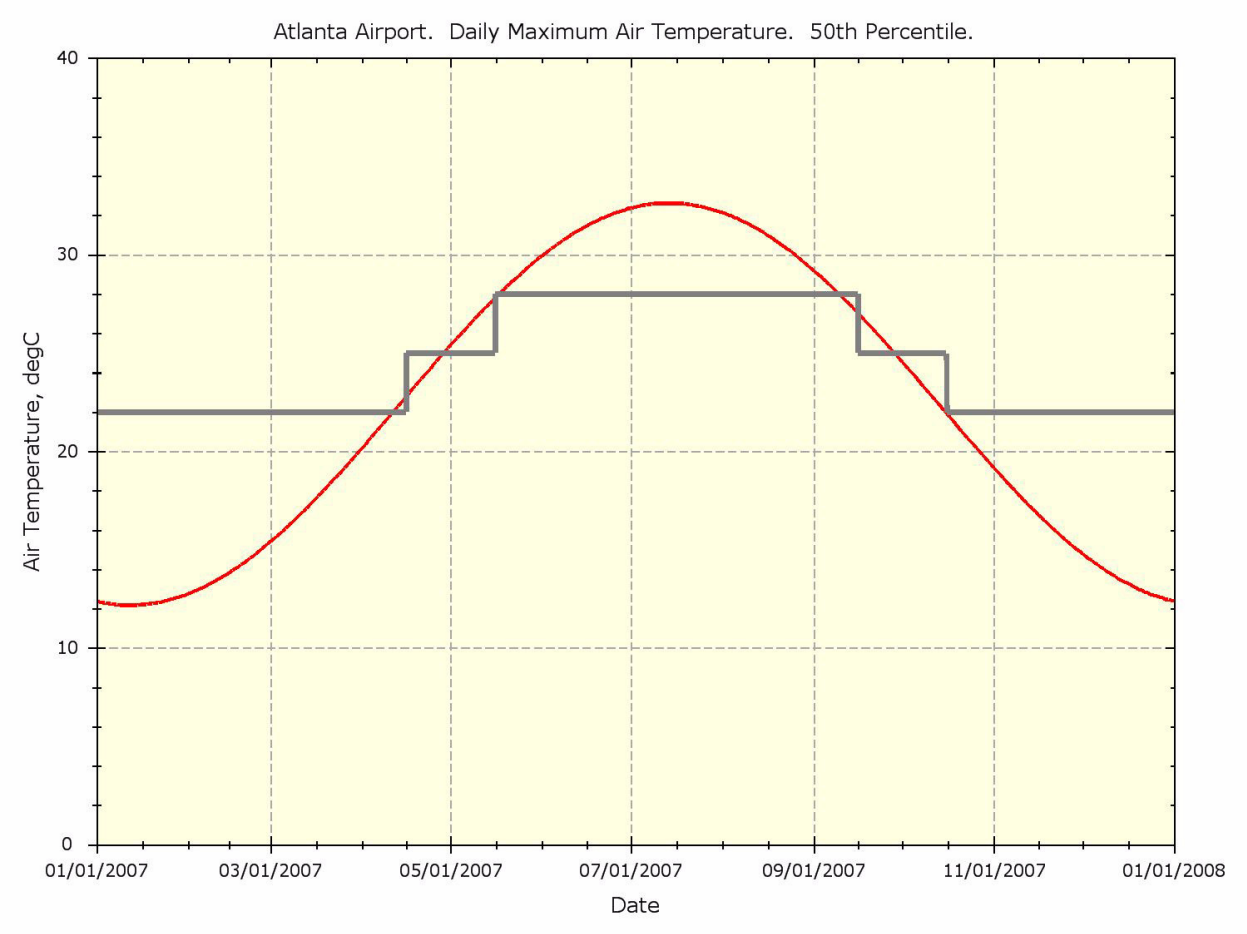
Zone 2
Seasonal Maximums

Compare Temperatures
At Paces Ferry Road
To Alternative Maximums


Paces Ferry Road. Hourly Temperature. Cy2002-2009
Temperature, degC
35
30
25
20
15
10
5
0
28 degC
26 degC
24 degC
22 degC
01/01/2002
01/01/2004
01/01/2006
01/01/2008
01/01/2010
Date

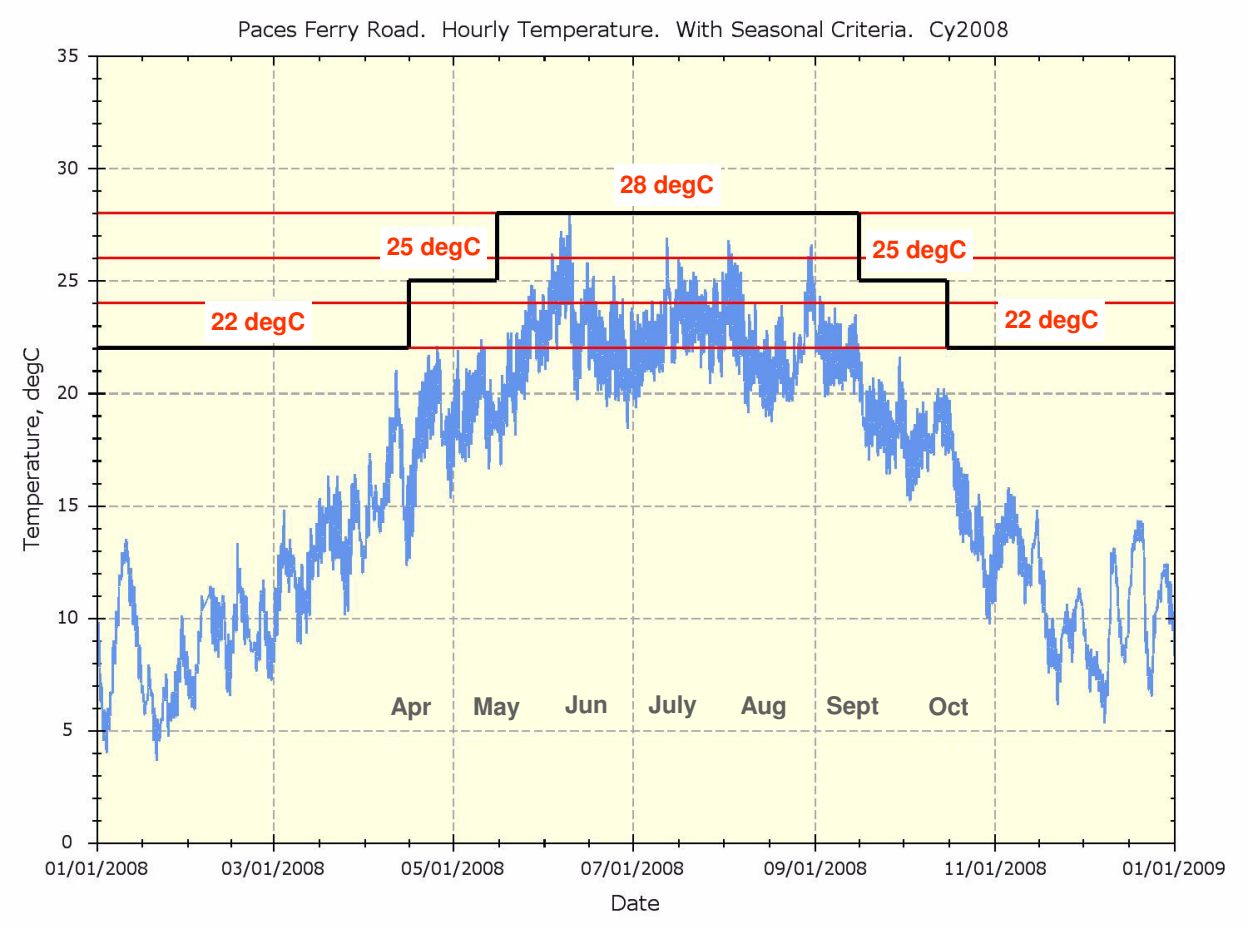
Zone 2
Seasonal Date Limits

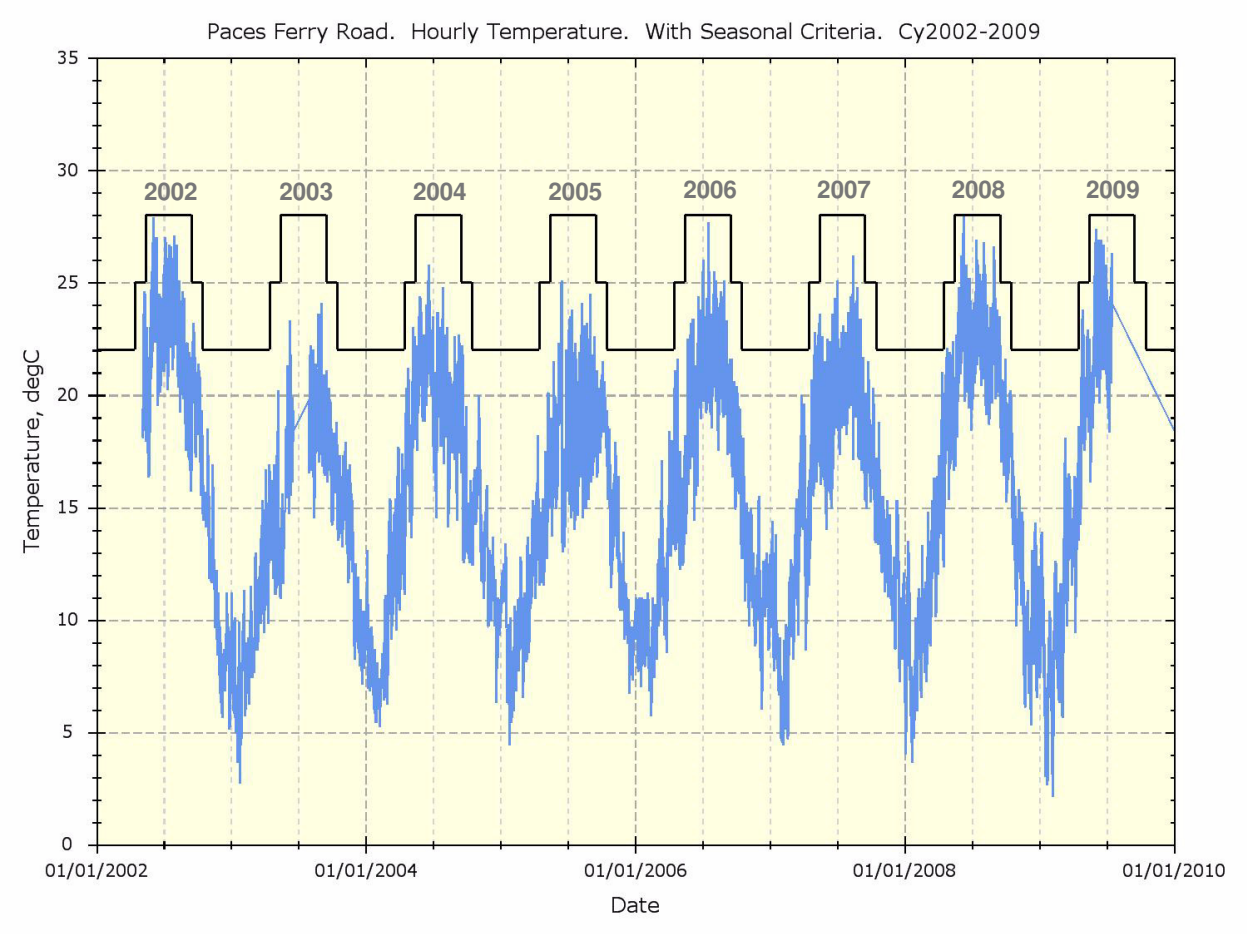
Recognize Historic Seasonal Patterns

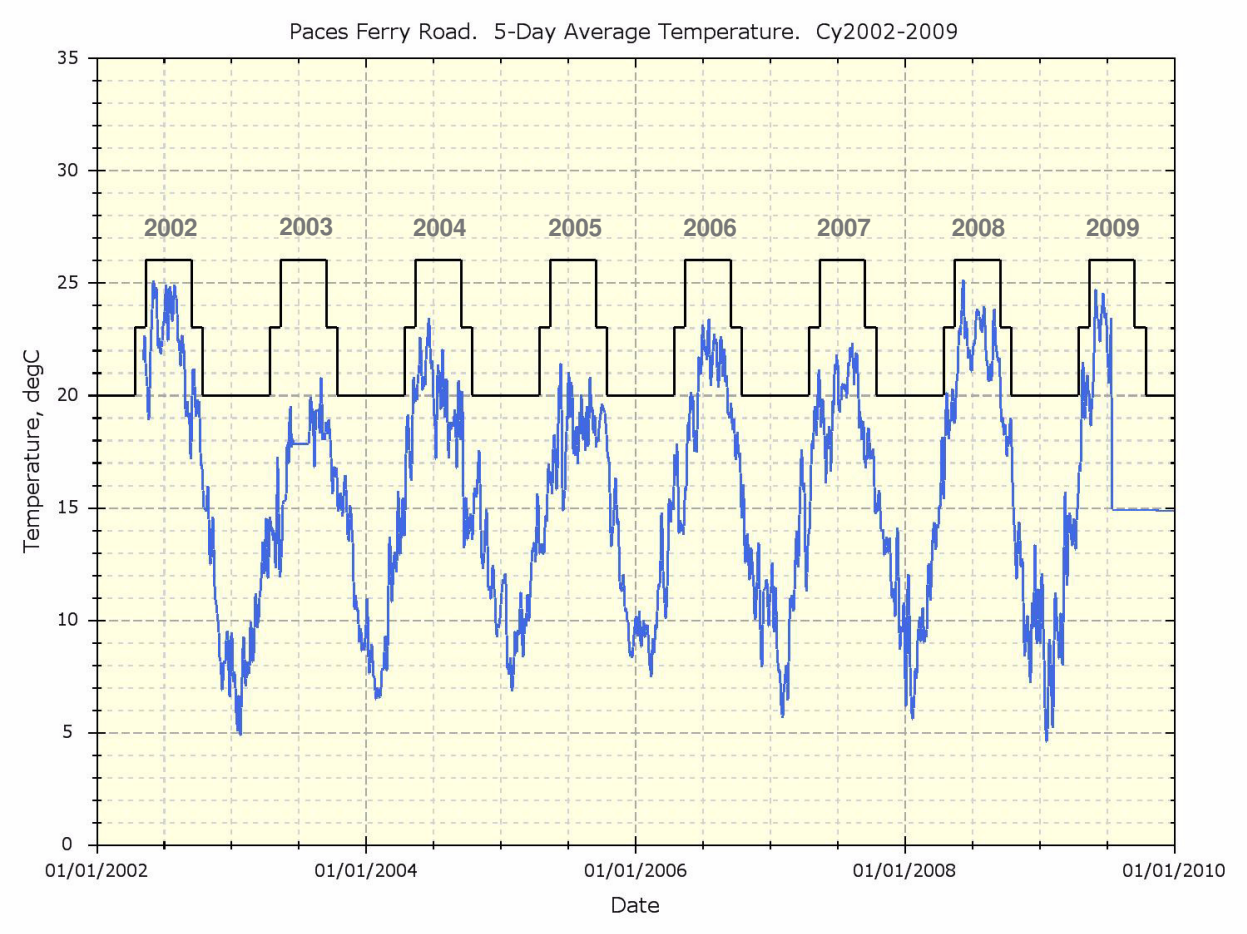

Atlanta Airport. Daily Maximum Air Temperature. 50th Percentile.
Air Temperature, degC
40
30
20
10
0
01/01/2007
03/01/2007
05/01/2007
07/01/2007
09/01/2007
11/01/2007
01/01/2008
Date

Set Seasonal Criteria

Cy2008 Example
A Recent Drought Year


Paces Ferry Road. Hourly Temperature. With Seasonal Criteria. Cy2008
Temperature, degC
Date
28 degC
25 degC
25 degC
22 degC
22 degC
Apr
May
Jun
July
Aug
Sept
Oct
0
5
10
15
20
25
30
35
01/01/2008
03/01/2008
05/01/2008
07/01/2008
09/01/2008
11/01/2008
01/01/2009


Paces Ferry Road. Hourly Temperature. With Seasonal Criteria. Cy2002-2009
Temperature, degC
35
30
25
20
15
10
5
0
2002
2003
2004
2005
2006
2007
2008
2009
01/01/2002
01/01/2004
01/01/2006
01/01/2008
01/01/2010
Date


Paces Ferry Road. 5-Day Average Temperature. Cy2002-2009
Temperature, degC
35
30
25
20
15
10
5
0
2002
2003
2004
2005
2006
2007
2008
2009
01/01/2002
01/01/2004
01/01/2006
01/01/2008
01/01/2010
Date

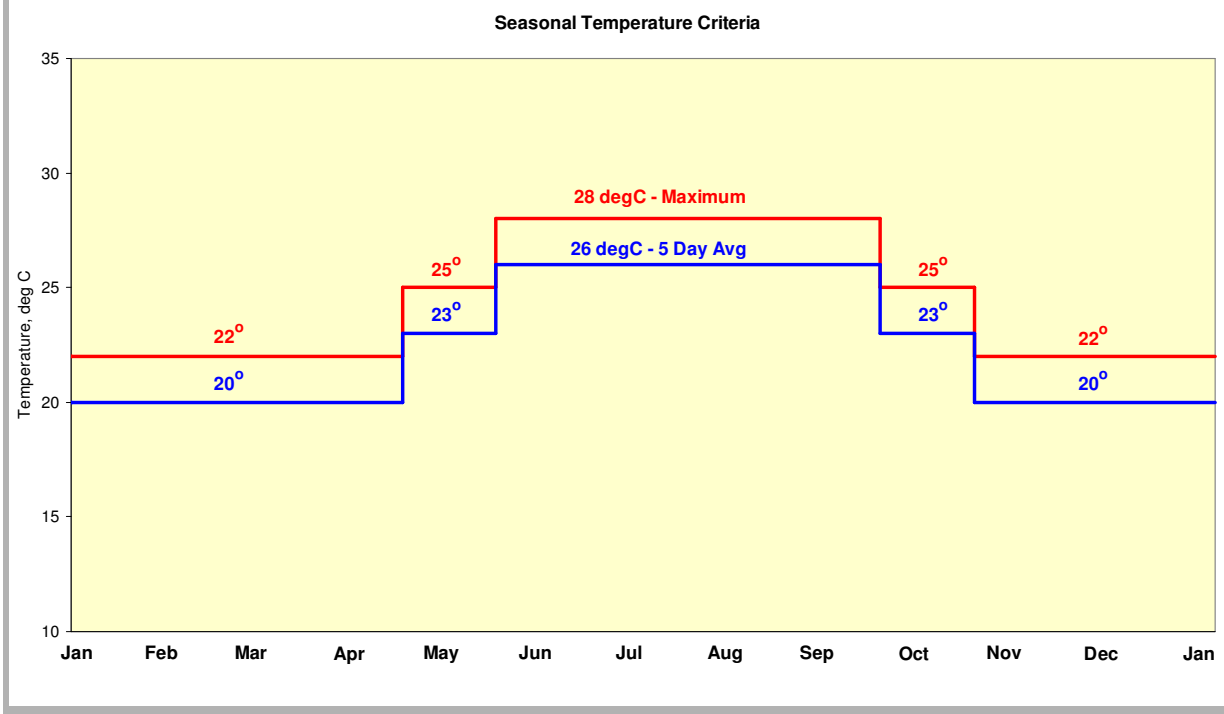
Zone 2
Seasonal Criteria Language

Zone 2: Designation and Criteria
Seasonal Upper Chattahoochee Tailwater

- ***During the period from 16 October through 15 April, the receiving water temperature shall not exceed 22°C (71.6°F) maximum or 20°C (68°F) as a 5-day average more than once in 30 days in each case;***
- ***During the periods from 16 April through 15 May and 16 September through 15 October the receiving water temperature shall not exceed 25°C (77°F) maximum or 23°C (73.4°F) as a 5-day average more than once in 30 days in each case; and,***
- ***During the period from 16 May through 15 September the receiving water temperature shall not exceed 28°C (82.4°F) maximum or 26°C (78.8°F) as a 5-day average more than once in 30 days in each case.***

- **Temperature criteria will be monitored for compliance at USGS gage 02336000 Paces Ferry Road.**

- **Designated to protect the seasonal trout fishery that occurs below Morgan Falls Dam**

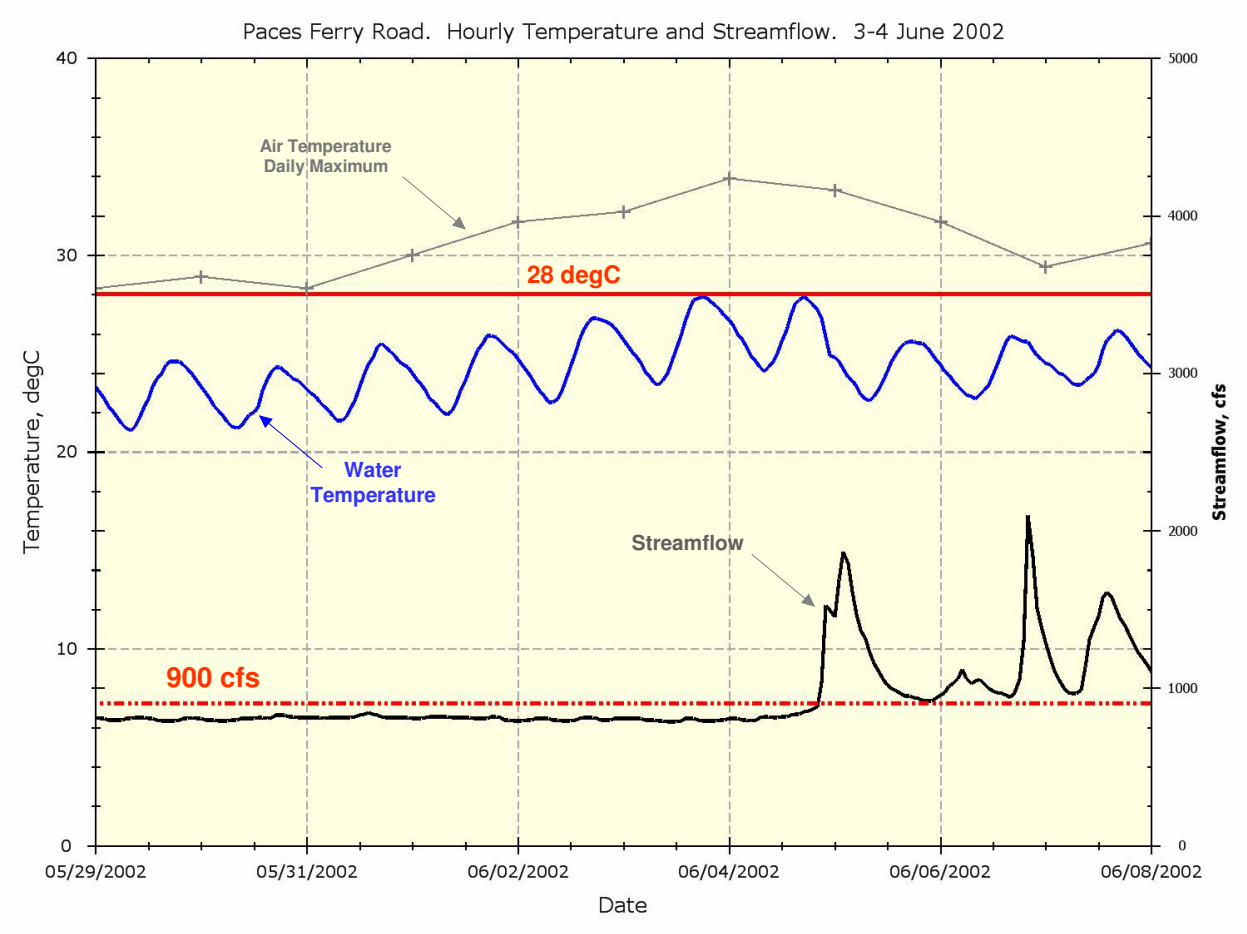

Seasonal Temperature Criteria
Temperature, deg C
35
30
25
20
15
10
28 degC - Maximum
26 degC - 5 Day Avg
22°
20°
25°
23°
25°
23°
22°
20°
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan

Zone 2
Low Flows and Droughts

Zone 2: Critical Conditions
Seasonal Upper Chattahoochee Tailwater

When these conditions occur together

- **Elevated air temperatures**
- **Persistent dry spells, low tributary flow**
- **Extended period of non-generation at Buford Dam**


Paces Ferry Road. Hourly Temperature and Streamflow. 3-4 June 2002
Air Temperature
Daily Maximum
28 degC
Water
Temperature
Streamflow
900 cfs
Temperature, degC
Streamflow, cfs
Date
40
30
20
10
0
5000
4000
3000
2000
1000
0
05/29/2002
05/31/2002
06/02/2002
06/04/2002
06/06/2002
06/08/2002

Zone 2: Exception
Seasonal Upper Chattahoochee Tailwater

"During the period from 16 April thru 15 October, criteria exceedences will not be considered violations and will not be used to develop the State's 303(d) listing of impaired waters if they occur under the following conditions:

For Seasonal Upper Chattahoochee Tailwater Trout waters. Flows of 900 cfs or less at Paces Ferry Road."

Questions?